

Status of the Claims

This listing of claims will replace all prior versions, and listings of claims in the application.

1. (currently amended) An injection molding apparatus, comprising:
a hot runner manifold including at least two manifold channels;
at least two nozzles, each of said at least two nozzles defining a nozzle channel in fluid communication with a respective one of said at least two manifold channels;
at least one of said at least two nozzles including ~~at least two~~ nozzle bodies coupled together removably fastened in tandem, said nozzle bodies including at least an upstream nozzle body, having an upstream end adjacent said manifold channel and an downstream end, and a downstream nozzle body, having a downstream end adjacent a mold plate and a upstream end adjacent the downstream end of the upstream nozzle body;
a separate and removable nozzle tip retained in a said downstream end of said downstream nozzle body; and
another nozzle tip coupled to another one of said at least two nozzles.

2. (currently amended) The injection molding apparatus of claim 1, further comprising a threaded connection configured to removably couple ~~wherein~~ said nozzle bodies ~~are removably fastened via a threaded connection.~~

3. (currently amended) The injection molding apparatus of claim 2, wherein said threaded connection includes a first set of threads and a second set of threads, wherein said first set of threads are made of a material that is different from said second set of threads.

4. (currently amended) The injection molding apparatus of claim 2, wherein at least one of said upstream nozzle body or said downstream nozzle body includes threads made from a material that is different from said nozzle bodies.

5-6. (cancelled)

7. (currently amended) The injection molding apparatus of claim 1, wherein at least one of said nozzles includes an intermediate nozzle body, wherein an upstream end of said intermediate nozzle body is removably fastened to said downstream end of said upstream nozzle body and ~~said a~~ downstream end of said intermediate nozzle body is removably fastened to said upstream end of said downstream nozzle body.

8. (currently amended) The injection molding apparatus of claim 1, wherein said nozzle tip is configured to be retained in said downstream nozzle body by a removably fastened connection.

9. (currently amended) The injection molding apparatus of claim 8, wherein said nozzle tip is configured to be retained in said downstream nozzle body via a threaded connection.

10. (original) The injection molding apparatus of claim 1, wherein each of said nozzle bodies includes a heater attached thereto.

11. (original) The injection molding apparatus of claim 10, wherein said nozzle tip does not have a heater attached directly thereto.

12. (currently amended) The injection molding apparatus of claim 1, wherein said upstream end of said upstream nozzle body is ~~coupled~~ threadably connected to said manifold ~~via a threaded connection~~.

13. (original) The injection molding apparatus of claim 1, wherein said upstream end of said upstream nozzle body is slidably connected with said manifold.

14. (currently amended) The injection molding apparatus of claim 1, wherein at least one of said ~~plurality of~~ at least two nozzles includes a valve pin and an actuator, the actuator configured for extending and retracting said valve pin.

15. (currently amended) The injection molding apparatus of claim 14, wherein said at least one of said ~~plurality of~~ at least two nozzles includes at least one valve pin guide.

16. (currently amended) The injection molding apparatus of claim 14, wherein a pin support is disposed between ~~an~~ said upstream end of said upstream nozzle body and said hot runner manifold.

17. (currently amended) The injection molding apparatus of claim 1, wherein said nozzle tip is made from a different material than said ~~plurality of~~ nozzle bodies.

18. (currently amended) The injection molding apparatus of claim 17, wherein the material making up said nozzle tip has ~~a material having~~ a high thermal conductivity.

19. (currently amended) The injection molding apparatus of claim 1, ~~further comprising a~~ wherein the mold plate comprises a split mold plate, including that includes a plurality of mold plates.

20. (original) The injection molding apparatus of claim 1, wherein said nozzle tip includes an extended portion that is slidable within a bore in said mold plate.

21. (currently amended) An injection molding apparatus, comprising:
a manifold defining at least two manifold channels;

at least two nozzles, each of said at least two nozzles defining a nozzle channel in fluid communication with a respective one of said at least two manifold channels and coupled to respective nozzle tips; and

at least one of said at least two nozzles including at least two nozzle bodies, the at least two nozzle bodies including an upstream nozzle body directly connected in tandem with and a downstream nozzle body ~~coupled in tandem~~ via a removably fastened connection, and a respective one of the nozzle ~~tip~~ tips being disposed in a downstream end of said downstream nozzle body;

wherein each of said at least two nozzle bodies includes at least one heater attached thereto, and

wherein each of said nozzle tips does not have a separate heater connected directly thereto.

22. (currently amended) The injection molding apparatus of claim 21, wherein said at least one heater attached to each of said at least two nozzle bodies ~~has a first heater~~ is at least partially embedded therein.

23. (currently amended) The injection molding apparatus of claim 22, wherein said at least one heater ~~each of said nozzle bodies~~ includes at least two heaters.

24. (currently amended) The injection molding apparatus of claim 23, wherein said at least one heater includes first and second heaters, such that said each of said nozzle bodies includes a second heater is at least partially embedded in each of said at least two nozzle bodies therein.

25. (currently amended) The injection molding apparatus of claim 23, wherein said at least one heater includes first and second heaters, such that said second heater is embedded in respective heating bands coupled to each of said at least two nozzle bodies ~~includes a second heater embedded in a heating band coupled to said nozzle body.~~

26. (currently amended) An injection molding apparatus, comprising:
a manifold defining at least two manifold channels;
at least two nozzles, each of said nozzles defining a nozzle channel in fluid communication with a respective one of said manifold channels; and
at least one of said nozzles ~~nozzle~~ including at least two nozzle bodies, including at least a upstream nozzle body and a downstream nozzle body removably fastened in tandem;
wherein each of said nozzle bodies includes at least a first heater and a second heater, wherein each of at least said first heater is embedded into each of said nozzle bodies ~~body~~.

27. (currently amended) The injection molding apparatus of claim 26, wherein each of said second heater is embedded in a heating band surrounding an outside surface of each of said nozzle bodies ~~body~~.

28. (original) The injection molding apparatus of claim 27, wherein said heating band comprises a material having a high thermal conductivity.

29. (original) The injection molding apparatus of claim 26, wherein each of said first heater and said second heater have separate electrical connections extending therefrom.

30. (original) The injection molding apparatus of claim 26, wherein said downstream nozzle body includes an electrical connection for at least one of said first and second heaters with leads exiting said injection molding apparatus through a bore between a first and second mold plate.

31. (original) The injection molding apparatus of claim 26, wherein said downstream nozzle body includes an electrical connection for at least one of said first and second heaters with leads drawn along an opening in a mold plate into which said nozzle is inserted.

32. (currently amended) The injection molding apparatus of claim 26, wherein a nozzle tip is disposed in a downstream end of said downstream nozzle body;

33. (original) The injection molding apparatus of claim 32, wherein said nozzle tip is not heated by a separate heater attached directly thereto.

34. (currently amended) The injection molding apparatus of claim 26, wherein both said first heater and said second heater are embedded in each of said nozzle bodies ~~body~~.

35. (new) An injection molding nozzle apparatus, comprising:

first and second nozzles each defining a nozzle channel that is in fluid communication with corresponding first and second manifold channels of a hot runner manifold, at least one of the first and second nozzles including upstream and downstream nozzle bodies coupled together, the upstream nozzle body having an upstream end adjacent the manifold channel and the downstream nozzle body having a downstream end adjacent a mold plate;

removable nozzle tips coupled to each of the first and second nozzles; and

a spacer having a first end threaded to the upstream nozzle body and a second end threaded to the downstream nozzle body.

36. (new) The injection molding nozzle apparatus of claim 35, wherein said spacer is made from a different material than said upstream and said downstream nozzle bodies.